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THE COMMON BARBERRY AND THE BLACK STEM RUST

Radio talk by C. R. Hall, Minneapolis, January 12, 1925

This is the story of the common barberry bush. It concerns every man, woman and child within the sound of my voice tonight. The common barberry bush carries the stem rust of wheat. Wheat makes our flour. Every person above babyhood eats wheat flour every day in bread or other food stuffs. Whatever destroys our wheat takes away the daily bread for which we work and pray.

History of the Common Barberry in America

Once upon a time, more than 200 years ago, the early colonists along our Atlantic coast brought the barberry bush with them from their home across the sea. They loved it for its bright red berries hanging in graceful drooping clusters during the long snowy winters. They wanted it also for the jelly, the herb tea, and the dye stuff for homespun which is furnished. Little did they dream of the penalty which their descendants would have to pay.

As settlement advanced from the Atlantic coast across the Appalachians, and out over the Mississippi Valley, the barberry bush was carried westward with it. Other plants took its place for jelly, for tea and for dye, but it still was a beautiful dooryard shrub and oftentimes a hedge to turn the cattle.

It has long been known that this common barberry caused injury to wheat. Nearly 200 years ago, farmers in Massachusetts noticed that their wheat was ~~harmed~~ near barberry hedges. In 1755 a law was passed requiring that such

hedges be destroyed. The colonists did not know why the bush was injurious. They only saw the effect it produced. It was almost a hundred years later that scientists proved the real connection between the common barberry and the stem rust of wheat.

Life Story of Black Stem Rust

The life story of the black stem rust is a most amazing tale. You all know the story of the four stages of the butterfly and other insects. First we have the egg, then the worm, next the chrysalis or pupa, and finally the adult. Many fungi also have more than one stage. Fungi are tiny plants which live as parasites on other larger plants. The stem rust is one of these microscopic parasitic plants and it also has four stages. This tiny rust plant lives over winter in the north in the form of black, seed-like spores on straw and stubble.

In the spring these black spores germinate and produce tiny white or colorless spores, called sporidia. This is the first stage of stem rust. These white spores blow about on the spring breeze, and if they fall on the leaves of the common barberry they produce the second or cluster-cup stage. It appears as clusters of small cup-shaped spots. These cluster cups break open and the yellow spores blow about on the early summer breezes.

When a yellow spore falls on a wheat stem, or on wild grasses, it germinates, if the air is warm and moist, and presently produces a red rust spot or pustule just under the skin of the plant. This spot contains a mass of red seed-like spores. This is the third or summer stage, called red rust. There may be hundreds of these pustules on a single wheat plant.

These pustules break and millions of red spores are released. They blow about and start more rust wherever they germinate on wheat and other cereals. A new crop of millions of these red spores may be produced every week or ten days if the weather is warm and moist. The rust then spreads like wild fire. Many people think the red rust is harmless but it really is the third stage of the terrible black rust.

A little later, as the wheat plants begin to mature, the rust fungus produces the fourth stage, the black or winter spores. This is the black stem rust which everybody dreads. It saps the strength and shrivels the kernels of the wheat. These black spores live through the winter and start the rust on the barberry in the spring. They can not start rust on grains or grasses but only on the common barberry. The Japanese barberry is harmless and can be planted; for it does not carry rust.

Stem Rust Epidemics

In 1904 an immense epidemic of stem rust swept over the wheat-growing region of the North-central States. It caused an enormous loss to farmers and through them to everyone who eats wheat bread. Even when there is no epidemic, losses estimated at about fifty million bushels of wheat occur every year. This is a heavy tax to pay. In 1916 came another terrible epidemic. It is estimated to have destroyed nearly two hundred million bushels of wheat in the upper Mississippi Valley, besides the loss in Canada. This was at a time when our wheat was sorely needed to feed the armies of the allies in Europe. This rust epidemic caused a loss of hundreds of millions of dollars to American farmers.

The Eradication Campaign

As a result of this enormous loss of wheat, it was determined to start a campaign to utterly destroy the common barberry in the great region where rust losses had been heavy. During 1917 the plans were developed. An appropriation was granted by Congress, effective July 1, 1918. The campaign of eradication then began in earnest and has continued with increasing vigor ever since. It is a gigantic enterprise, covering an area more than 1,500 miles long by 700 miles wide. It includes thirteen North-central States, from Ohio and Michigan on the east to Colorado, Wyoming and Montana in the west. It is conducted as a great cooperative project. The agencies chiefly concerned in the work of finding and exterminating the bushes are the U. S. Department of Agriculture, the State Colleges of Agriculture, and the State Departments of Agriculture. To these are added other interested agencies of all kinds, including the public school system, private educational institutions, nurserymen, farmers' organizations, groups and organizations of business and professional men, and many others. One of the most helpful of these has been the Conference for the Prevention of Grain Rust, representing commercial and agricultural organizations.

Nurserymen were asked to destroy the tens of thousands of bushes they had for sale. Property owners in town and country were asked to kill the bushes they prized. The first step was to tell the story of the common barberry and black stem rust to the thirty millions of people in the thirteen States. A great publicity campaign was launched. Thousands of articles have been published in city and village papers, and farm journals. Talks and lectures have been given by the hundreds. Bulletins, pamphlets and pictures have been sent out by the millions. Lantern slides and motion pictures have

been in constant use. Posters have been displayed widely in both public and private buildings. Demonstrations and exhibits have been made at State and County fairs. No scientific fact has been told more widely or received more readily. Splendid cooperation has resulted.

Problems of Eradication

Barberry eradication has not been all joy. Little was known about the numbers and distribution of the common barberry bush when the campaign began. It was thought that the bushes were mostly planted for ornament in cities and towns, with a few hedges on farms. When the survey was begun on the farms and in the woodlands it was found that this idea was all wrong. Only about two and a quarter millions of original bushes have been found in cities and towns, while nearly nine millions of bushes, old and young, have been located in the rural districts.

Where did all these bushes come from? Those in the cities, towns and villages were planted for ornament. Some of those in the country had been planted for ornament or for hedges, but the great bulk of them were escaped, or "running wild," as we say.

When barberries get to be a few years old they begin to produce an abundance of bright red berries. Many kinds of birds eat these berries greedily, especially in winter when other food is scarce and the berries are very conspicuous. Wherever the birds roost in groves, orchards, thickets, or woodlands, the seeds have been dropped and seedlings have appeared. This has been going on for one hundred years or more in the older settled portions of the territory. Millions of these seedlings grew to be fruiting bushes in their turn and have started new crops of seedlings. The worst

areas of these escaped bushes have been found in the rolling timbered portions of Wisconsin, Illinois, Minnesota and Iowa. Nearly half a million plants of all ages were found in one area of rocky wooded bluffs along the Mississippi River in Wisconsin.

It is no easy job to find all these millions of escaped bushes, especially the tiny seedlings coming up among the grasses, weeds and dead leaves. The bushes were found along fence rows, in brushy pastures, in clumps of shrubbery, in thickets, in open woodlands, in weed patches and along stream banks. Sometimes they stand boldly in the open, sometimes they are completely hidden by other vegetation, but the field assistant has to find them, whether big bushes or tiny seedlings, and when he has found them he has to kill them so they will stay dead.

This proved to be a real problem. When we first started the work seven years ago, we dug them up with spade and mattock, or pulled them out by the roots with teams or tractors. We thought that would kill them, but it didn't. Little pieces of root or root-stock left in the soil sprouted promptly. A whole flock of sprouts came up where one bush had been before.

Then began a long hunt for chemicals which would kill bushes so completely that there would be no sprouts. After trying about forty different chemicals, common rock salt and sodium arsenite were the two which did the business cheaply and surely. Unfortunately, sodium arsenite proved poisonous to cattle and sheep, so its use had to be dropped. Salt now is used almost exclusively and with good results.

Results of the Eradication Campaign

The eradication campaign has been long and hard, but the end is beginning to appear. The thirteen States contain 976 counties, of which about 900 required survey to locate and destroy common barberries. The first original survey has been completed in Indiana, Iowa, North Dakota, South Dakota, Wisconsin and Wyoming, and practically completed in Colorado, Minnesota and Nebraska. There still remain about 110 counties to cover. Of these about 60 are in Illinois, 20 each in Michigan and Ohio, and 10 in Montana.

A second complete survey has been found necessary in some of the worst counties, especially those done in the early years when the men were inexperienced. About 110 counties already have been covered by the second survey and 10,000 bushes missed in the original survey have been found and destroyed. The complete records show that the men found about 92 per cent of the bushes in the original survey and the other 8 per cent in the second survey. Many of the 8 per cent missed had been cut off before our men came and they could not find the cut stems among the weeds and grasses. Later these cut stems sprouted and these sprouts betray the location.

Resurveys to find sprouts and newly developed seedlings will be necessary for several years. If these sprouts and seedlings are allowed to develop they will start rust again. If they are allowed to become old enough to produce seeds, birds will scatter them again over the pastures and woodlands which have been cleaned. Then the whole long and expensive job will have to be done over again.

In the entire campaign of 6½ years, 6,358,000 original bushes, 4,607,000 seedlings and 274,000 sprouting bushes have been found. This makes a grand total of 11,239,000 bushes of all kinds, or more than one bush for every three persons in these thirteen great States. The total amount expended by the United States Department of Agriculture in this work to date has been \$1,700,000. State and private agencies have contributed about \$460,000 more. Therefore, more than 11,000,000 bushes have been found and recorded, and most of them killed, at an average cost of less than 20 cents per bush.

About 10,635,000 of these bushes and seedlings have been destroyed. This means that during these six and one-half years about 135,000 barberry plants have been killed in every month, 4,430 in every day, 187 in every hour, or 3 in every minute. Let me repeat. From the time this campaign began until the present minute, day and night, week days and holidays, winter and summer, three barberry plants have died in every 60 seconds. Every time you tie your necktie, or powder your nose in the morning, three bushes have perished. Every time you go out to lunch and come back in an hour 187 bushes have gone. Every time the sun rises it sees 4,430 fewer barberries than on the day before. While you took your month of vacation, 135,000 barberry bushes disappeared forever.

Cooperation

What is your part in this great work, my friends? Four things!

1. Teach the story of common barberry and black stem rust to your friends and neighbors.

2. Stand behind the Federal, State, and private appropriations to finish this big job.

3. Learn to know the common barberry bush and to hate it as you would a rattlesnake.

4. If you find one anywhere in these thirteen States, report it at once to your State Agricultural College or the United States Department of Agriculture. They will tell you what to do with it.

Your hearty cooperation is greatly appreciated. I thank you.
